a minute or two fallen with a well-marked "water-hammer" click. No gauge was attached to the pump. We do not, of course, regard such a vacuum as perfect; but it was sufficient for our purpose, and, as regards the Pasteur solution, proved fatal to the contained organisms.

In the experiment of which *Obs.* 3 is here given as an example we observe, on the one hand, the prevention of bacterial development and consequent growth of mycelial forms (the quantity of light being insufficient for the destruction of these) in those tubes which were insolated in the presence of ordinary atmospheric air. On the other hand we see specimens of the same urine insolated to precisely the same degree as the former, but, *in the absence of an atmosphere*, becoming turbid, even *in vacuo*, with *Bacteria* as early as their encased congeners.

This remarkable fact, then, appears to follow as a deduction, that a vacuum (or approximation to such) which of itself is a condition antagonistic to the development of *Bacteria*, nevertheless shields these organisms from the germicidal effect of light *.

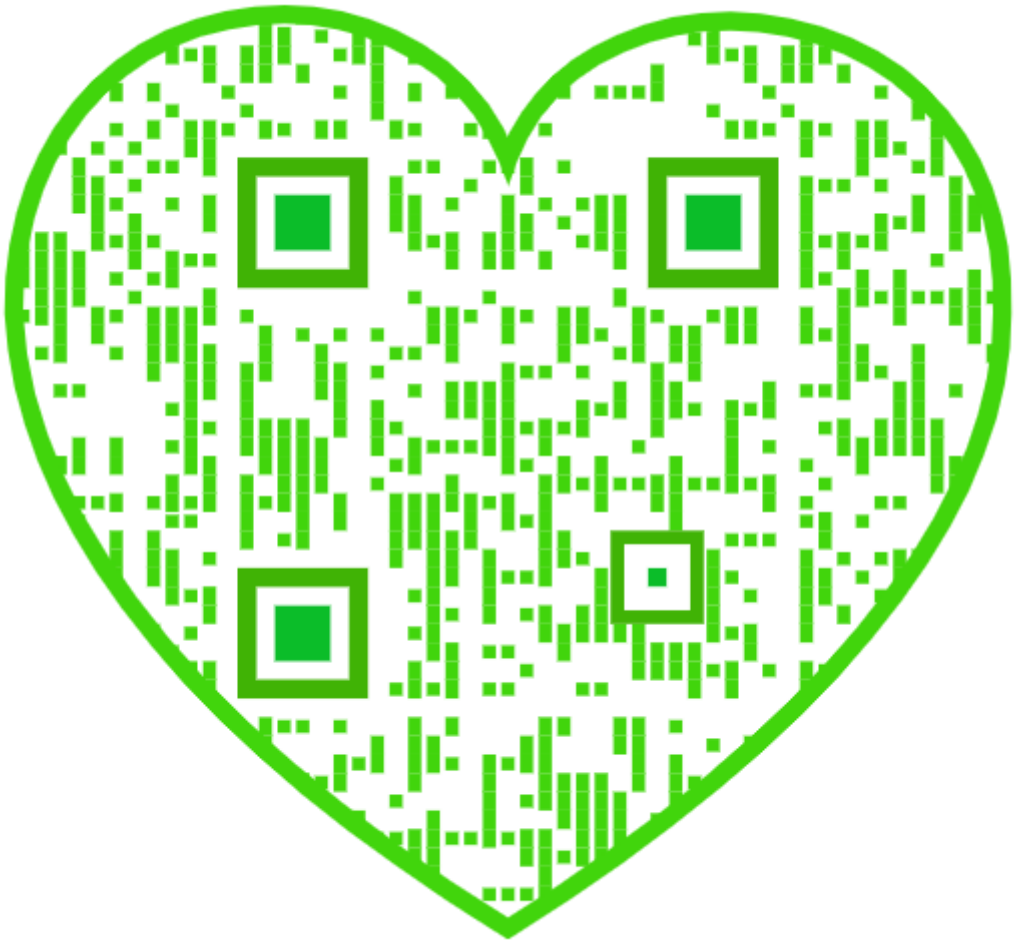
It is not our present purpose to speculate on the interpretation of the phenomena here presented, nor should we be justified in so doing until we have further extended our observations, and more fully confirmed the curious results here provisionally detailed.

IV. "Points of Resemblance between the Suprarenal Bodies of the Horse and Dog, and certain occasional Structures in the Ovary." By Charles Creighton, M.B., Demonstrator of Anatomy, Cambridge University. Communicated by Professor Humphry, F.R.S. Received October 12, 1877.

(Abstract.)

The object of this communication is to prove, with the aid of accurate drawings, that there exists an essential resemblance between the constituent parts of the suprarenal bodies of mammals and certain structures in the mammalian ovary that are of occasional but normal occurrence. The appearances on which the comparison is based are best seen in the suprarenals of the dog and horse, and in the ovaries of the bitch. The suprarenals of the horse and dog are known to have, immediately under the fibrous tunic, a zone of follicles of singular though well-defined structure. The first point in the communication is one of criticism, and has reference to the division of parts within the suprarenal. It is held that the outer zone of follicles, as they are seen in the horse and dog, are quite unique among the structures composing the suprarenal, and are broadly contrasted with the rest of the organ lying internal to them. The contrast is unmistakable in these two animals, and it is equally

* We wish, however, to make it clear that we by no means insist on this explanation; the facts, indeed, admit of other explanations.



well-marked in the fœtal state of the organ in other mammals. In opposition, therefore, to the usual subdivision of parts, it is proposed to limit the term "cortex" to the extreme outer zone consisting of the peculiar structures above-mentioned, and to apply the term "medulla" to the general mass or parenchyma of the organ which the outer zone covers, including in the medulla the extreme central and generally pigmented part to which the term "medulles" has been hitherto limited. This proposed rearrangement of terms is based upon the fact that the outer zone has no continuity of structure with the zones next to it; whereas the extreme central part differs from the neighbouring parenchyma in unessential particulars, and chiefly in the character of the blood-vessels or blood-spaces within it.

The comparison with structures in the ovary is based upon the above radical distinction of cortex and general parenchyma in the suprarenals, and is worked out in two sections dealing with the two parts respectively. The structures in the ovary to which the cortical follicles are compared are here described for the first time, and the discovery of them, and of their nature, has been the starting-point of the present investigation. They are the remains of Graafian follicles within which the ovum, after reaching a degree of ripeness, has shrivelled up and disappeared. The appearances in question are numerous in the ovaries of the bitch, especially towards old age. Their structure is perfectly definite and their occurrence tolerably uniform. They are spoken of as obsolete Graafian follicles, and are to be carefully distinguished from those Graafian follicles from which a ripe ovum has been successfully discharged.

The ovarian structures to which the general parenchymatous mass of the suprarenal is compared are persistent *corpora lutea*, entirely solid and cellular. This part of the comparison occupies the second section of the paper, and the details of it are referred to at the end of the abstract.

Coming to the details of his comparison, the author first states the facts relating to the cortical suprarenal structures. Their form, especially in the horse, appears different in the surface section and in the perpendicular section. But, premising that the same differences of shape occur among the corresponding appearances in the ovary, they may be taken to be essentially elongated closed cylinders, straight, or curved, or tortuous, or doubled up. The cylinders are completely filled with long and narrow epithelial-like cells arranged in close order across their lumen, *i. e.* at right angles to their long axis. Each cell stretches across, generally speaking, the whole width of the cylindrical space; the nucleus of a cell is generally towards one end, and the other end is often pointed. Cells appear alternately to arise from opposite sides of the space, their pointed or relatively free extremities interlocking among the nuclear or basal ends of the cells opposite.

The same appearances are produced in the ovary in the following way. The Graafian follicle may be in a more or less advanced stage of ripeness. Either the *membrana granulosa* may closely invest the ovum, or it may be separated from the ovum (within its *cumulus proligerus*) by the cavity for the *liquor folliculi*. In the former class of cases, the *membrana granulosa* has a short circuit, in the latter it has a very much longer circumference. Within a follicle of either class the ovum decays, and the remains of it are expelled or absorbed. The circuit of the *membrana granulosa* has been broken, and the circular belt of cells is found either to have straightened itself out, if it were of small extent, or to have become folded or thrown into sinuosities if it belonged to one of the more distended or riper class of follicles. What remains of the aborted Graafian follicle is the *membrana granulosa*, in the form of a longer or shorter cylindrical body, straight, or slightly curved, or sinuous, or doubled up. These long, narrow, and variously curved cylinders, as they are found, in their ultimate state of quiescence, in the substance of the ovary, have the most remarkable superficial resemblance to the cortical cylinders of the suprarenal. But the resemblance in minute structure is still more remarkable. While the ovum was shrivelling up or decaying, the round and nuclear cells of the *membrana granulosa* were taking the shape of long and narrow columnar epithelial cells, stretching from one side of the belt to the other. These cells have their nucleus towards one end, and the cell is seated by that end either upon the outer or concave circumference of the belt, or upon the opposite convex or inner circumference, the two sets of cells interlocking with their free ends across the space. Comparing a given length of such ovarian cylinder with a corresponding length of cylinder in the suprarenal, the minute points of resemblance are as follows:—Both cylinders are completely filled with cells packed in close order across their long axis; the cells have precisely the same length and breadth, the same relation of attached ends and free ends, the former uniformly broad and containing the nucleus, and the latter pointed and interlocking with the attached end opposite. As regards cell-substance, and size and shape of nucleus, no differences are discernible.

The structures from two different organs, that are here brought into comparison, not only resemble one another closely, but they are each of them unlike any thing else in the body. The origin of the structures in the ovary can be traced in the clearest manner; they are the remains of Graafian follicles within which the ovum has aborted or decayed. The conclusion is that the cortical structures of the suprarenal are the obsolete condition of follicles that, in their active period, resembled the existing Graafian follicles; and that conclusion is so far in accordance with the hypothesis, based upon independent evidence, that the suprarenal body as a whole (and in its several parts) is an obsolete organ.

In the suprarenals of other mammals besides the dog and horse, the

structure of the cortical zone is not of a kind to suggest or to bear out the above comparison. But, according to Henle, the peculiar structures of the horse and dog are occasionally found in other mammals. An occasional reappearance is what might be looked for in an obsolete structure. But, exact similarity apart, there is in the suprarenals of all mammals a *zona glomerulosa*, which corresponds to the cortical zone above described; and the *zona glomerulosa*, being subject only to laws of heredity, and not to laws of function, may be considered in most mammals to have lost those distinctive features which survive, for unexplained reasons, in the dog and horse. Again, as regards the parallel structures in the ovary, they are seen clearly in the bitch, are indistinctly seen in the cat, and are not to be distinguished in the mare. But those differences are not fatal to the generalization, and explanations are offered of them.

In the second section of the paper the author describes the resemblance of the general intracortical mass of the suprarenal to another class of ovarian structures, viz. *corpora lutea*. The *corpora lutea* here spoken of are large cellular masses of very definite and stable structure, occurring at various points in the ovary, and in some cases of so great extent as to transform the ovary into an organ of altogether new appearance. Instances are referred to of ovaries from the mare and bitch in which *corpora lutea* seemed to have greater persistence than is usually attributed to them, and it is held that the prevalent theory of the circumstances of their formation and decay is not comprehensive enough.

Taking, however, the *corpora lutea* as they are found, and directing attention to their minute structure, they have the following points of resemblance to the intracortical mass of the suprarenal. Both structures are cellular throughout, and the individual cells are the same. The cells are epithelial-like and polyhedric, with a central nucleus and a wide zone of cell-substance. The cell-substance in both cases is so coarsely granular as often to resemble the vitellus of the mammalian ovum, and in both cases the granular protoplasm is sometimes replaced or occupied by a vacuole. The one point of difference is that the cells of the *corpus luteum* are half as large again as those of the suprarenal parenchyma. The second point is that the cells in both cases are set in a fine meshwork of fibres connected with the walls of the capillaries. Thirdly, there is, in both, the same radial arrangement of blood-vessels (capillaries) from centre to circumference. Fourthly, the central vein or system of venous lacunæ of the suprarenal has its counterpart in the *corpus luteum*. Lastly, there are points of resemblance relating to the pigmentation of the respective structures.

Although it is not essential to the justice of the comparison that the obsolete Graafian follicles should have the same position round the circumference of *corpora lutea* which the cortical suprarenal follicles have

round the parenchyma of that organ, yet there is to be seen in many preparations a curious similarity in that respect also.

The present communication does not go beyond a statement of points of resemblance. The *corpus luteum*, which enters so largely into the comparison, is itself as much an unsolved problem as the suprarenal. It may be said, however, to afford better opportunities of study; and if the resemblance above outlined be a resemblance in essentials, a sound theory of the suprarenal as a whole will probably be found to depend upon a sound theory of the *corpus luteum*.

December 13, 1877.

Sir JOSEPH HOOKER, K.C.S.I., President, in the Chair.

The Presents received were laid on the table, and thanks ordered for them.

Among the Presents was a transparent positive photograph of the sun on glass, taken at Meudon by M. Janssen, For. Mem. R.S., and presented by him to the Society.

Pursuant to notice given at the last Meeting, Marcellin Berthelot, Joseph Decaisne, Emil Du Bois-Reymond, Adolph Wilhelm Hermann Kolbe, Rudolph Leuckart, Simon Newcomb, and Pafnutij Tschebytschew were balloted for and elected Foreign Members of the Society.

The following Papers were read:—

I. "On Electrostriction." By EDMUND J. MILLS, D.Sc., F.R.S., "Young" Professor of Technical Chemistry in Anderson's College, Glasgow. Received August 7, 1877.

If the bulb of an ordinary thermometer be coated chemically with silver, and then electrically with a metallic deposit, the mercury will traverse some portion of the scale, and finally take up a definite position, independently of temperature. To this phenomenon I have given the name *electrostriction*. Of the metals hitherto worked with, copper, silver, iron, and nickel constrict the bulb; zinc and cadmium distend it.

The general conditions under which the experiments were made were as follow:—A thermometer coated with silver by immersion in a solution of ammoniacal argentic tartrate was placed vertically near a bare thermometer at one side of a depositing cell; the anode stood at a distance of 11 centimetres. The bulbs of the thermometers were about their own depth below the surface of the electrolyte; the covered one was turned half round at every comparison. The source of electricity was a pint